Supported Sensor List

Last updated: November 12, 2021

Temperature sensors

- MAX31865 RTD Temperature Sensor Amplifier
- MAX31856 Thermocouple Inferface
- MLX90614 Infrared Thermometer
- DS18B20 Waterproof Temperature Sensor
- Thermistors

DC Motor Drivers

- PWM DC Motor Drivers

Time Of Flight Range Finders

- VL6180 ranger
- VL53L0X ranger
- VL53L1X ranger

Strain gages

- HX711 Load Cell Amplifier

Rotational Encoders

- EMS22 absolute encoder

Soil Moisture

- Sparkfun soil moisture sensor

Inertial Modules

- LSM9DS1 iNEMO inertial module

Environmental Sensors

- BME280 PTH combo sensor
- CCS811 air sensor
- SCD30/40 CO_2 Sensirion module

Gas pressure

- MP3V5010DP Freescale/NXP pressure sensor

Displays

- SSD1325 OLED display

Light

- Panasonic GridEye AMG88 PIR sensor
- AS7263 spectrophotometer
- AS7265x spectrophotometer
- ISL29125 light sensor

Gas Flow

- MAX35104 TOF Gas Flow Meter SoC

Signal Generator

- AD9837 wave generator module

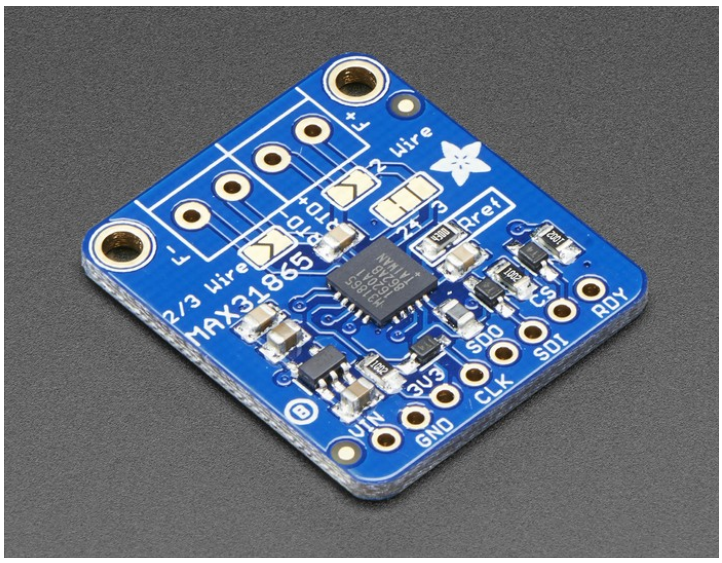
Liquid Chemistry

- EZO pH module
- EZO DO Dissolved Oxygenmodule
- EZO EC Electrical Conductivit module
- cAFEx modules

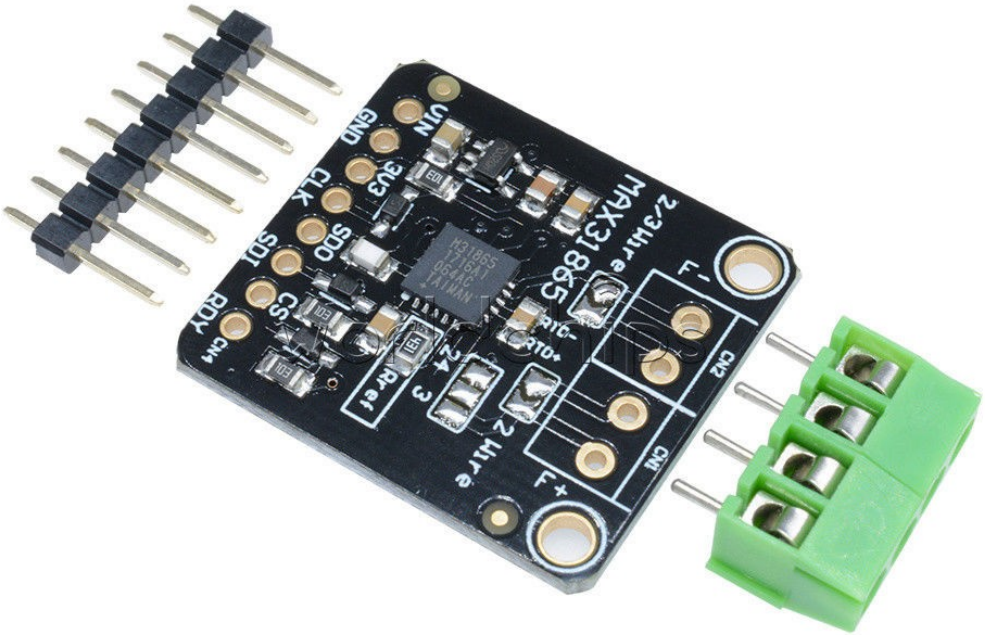
DCVoltage

- ADC-IC ADC Input Conditioner

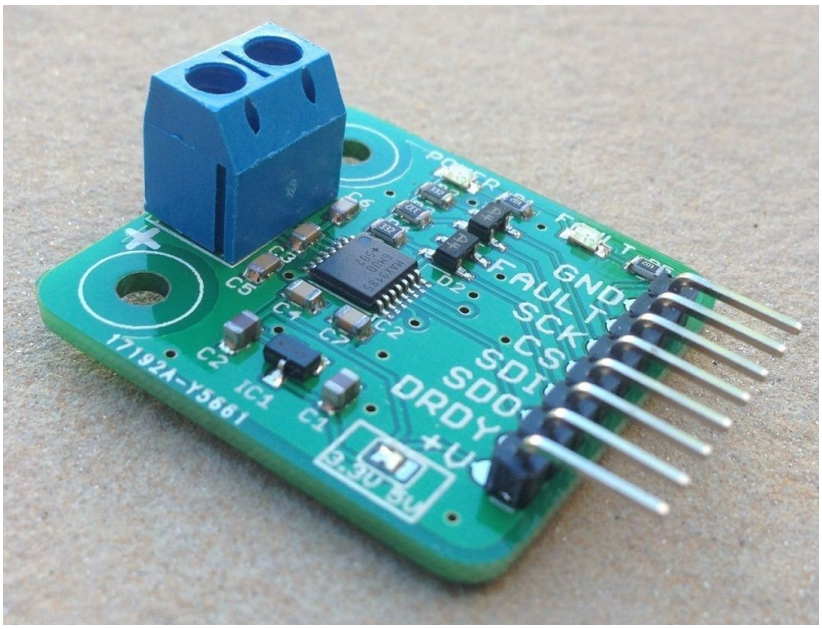
MAX31865 RTD Temperature Sensor Amplifier



The MAX31865 is an easy-to-use resistance-to-digital converter optimized for platinum resistance temperature detectors (RTDs). An external resistor sets the sensitivity for the RTD being used and a precision delta-sigma ADC converts the ratio of the RTD resistance to the reference resistance into digital form.



MAX31856 Thermocouple Inferface



A thermocouple is an electrical device consisting of two dissimilar electrical conductors forming electrical junctions at differing temperatures. A thermocouple produces a temperature-dependent voltage as a result of the thermoelectric effect, and this voltage can be interpreted to measure temperature.

Features

- 19-bit temperature resolution (MAX31855 is only 14-bit)
- Handles all thermocouple types (K, J, N, R, S, T, E, and B)
- Allows readings as high as +1800°C and as low as -210°C depending on thermocouple type

Applications

- Temperature Controllers
- Industrial Ovens, Furnaces, and Environmental Chambers
- Industrial Equipment

MLX90614 Infrared Thermometer

https://www.digikey.com/product-detail/en/melexis-technologies-nv/MLX90614ESF-BAA-000-TU/MLX90614ESF-BAA-000-TU-ND/1647941

The MLX90614 is an infrared thermometer for non-contact temperature measurements.

Features

- -70…+380°C for object temperature.
- High accuracy of 0.5°C in a wide temperature range (0…+50°C for both Ta and To)
- Measurement resolution of 0.02°C

Applications

- High precision non-contact temperature measurements
- Thermal Comfort sensor for Mobile Air Conditioning control system
- Temperature sensing element for residential, commercial and industrial building air conditioning
- Windshield defogging
- Automotive blind angle detection

- Industrial temperature control of moving parts
- Temperature control in printers and copiers
- Home appliances with temperature control
- Healthcare
- Livestock monitoring
- Movement detection
- Multiple zone temperature control – up to 127 sensors can be read via common 2 wires
- Thermal relay / alert
- Body temperature measurement

DS18B20 Waterproof Temperature Sensor

This sealed digital temperature probe lets you precisely measure temperatures in wet environments

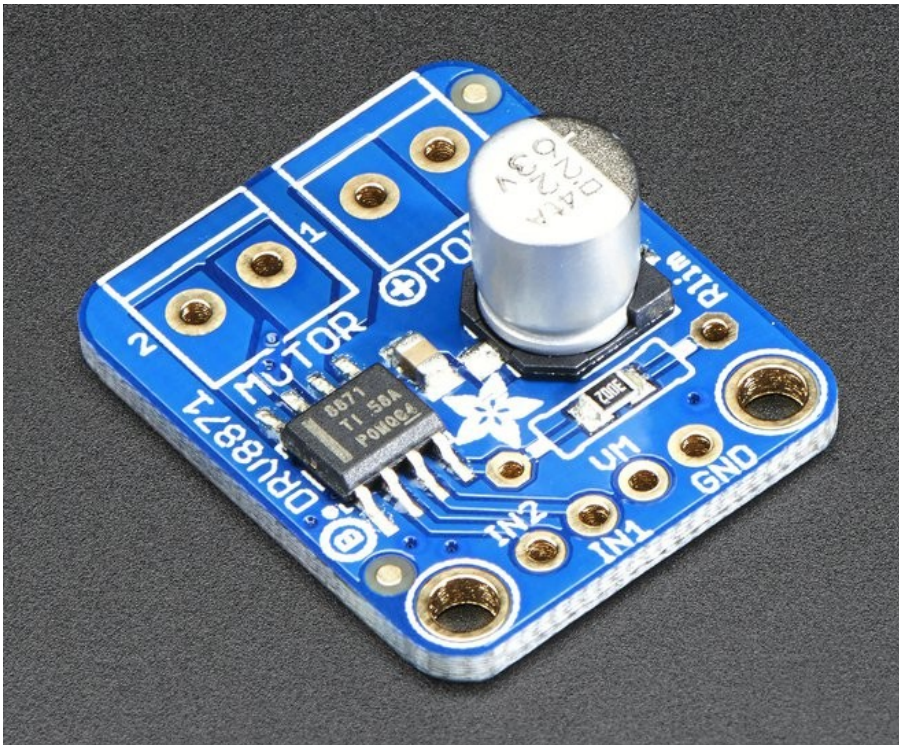
- Waterproof
- -55°C to+125°C (-67°F to +257°F) temperature range
- ±0.5°C accuracy from -10°C to +85°C
- Probe is 7mm in diameter and roughly 26mm long. Overall length (including wire) is 6 feet.

Thermistors

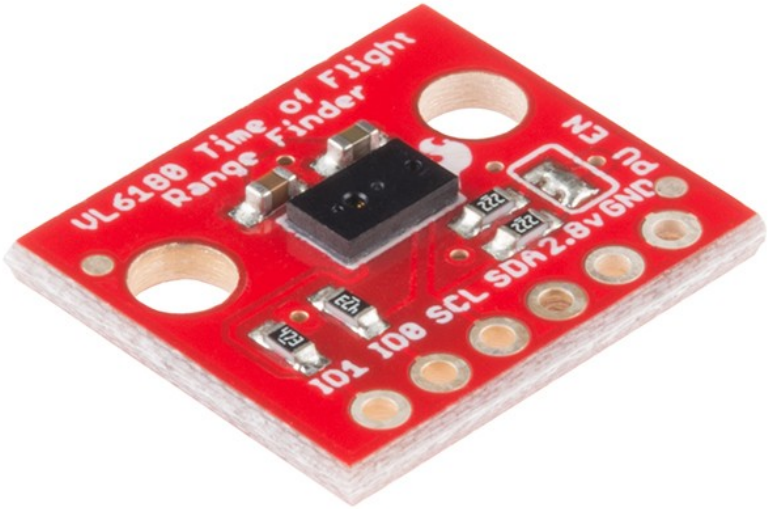
A **thermistor** is a type of resistor whose resistance is strongly dependent on temperature, more so than in standard resistors. LD100 supports NTC type thermistors through the ADC interface. An additional resistor is needed. The InstrumentationHub ADC-IC board has thermistor resistors and signal amplification built in, to support better precision.

PWM DC Motor Drivers

LD100 can control a variety of PWM controlled DC motor driver ICs. A typical example is the DRV8871.



VL6180
Time of Flight Range Finder (10cm/4inch range)

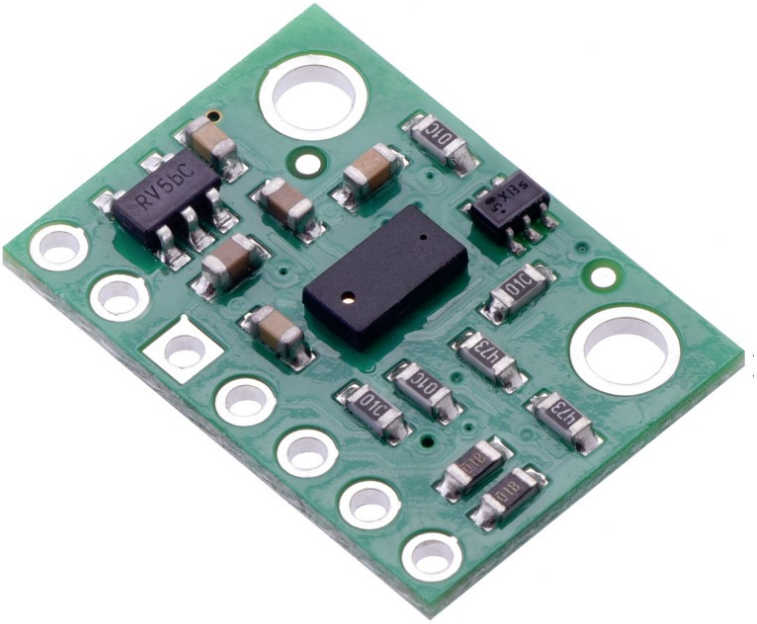


VL6180 uses a precise clock to measure the time it takes light to bounce back from a surface. This affords the ToF Range Finder and VL6180 a great benefit over other methods because it can be much more accurate and more immune to noise.

The VL6180 is actually a 3-in-1 package that combines an IR emitter, a range sensor, and an ambient light sensor together for you to easily use.

Measures absolute range up to 10cm

VL53L0X
Time of Flight Range Finder (2meter/6.6ft range)

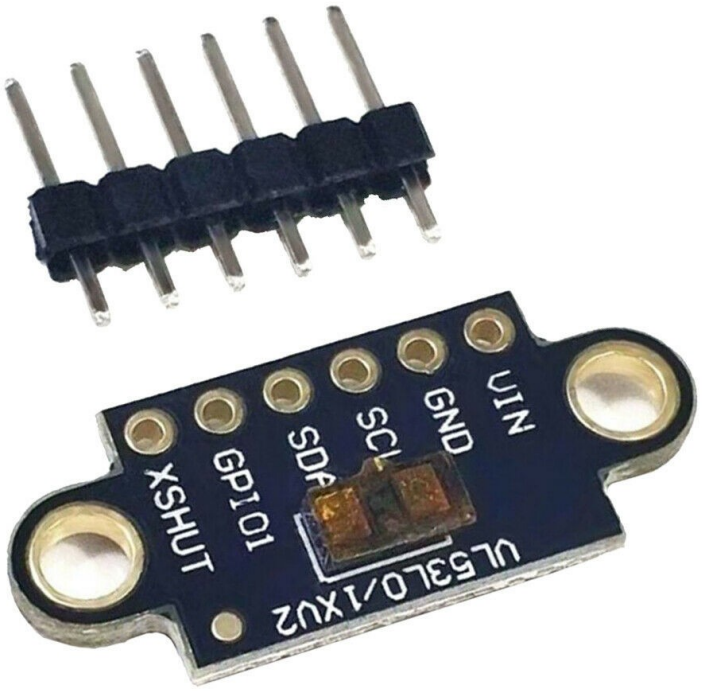


The VL53L0 uses ST's FlightSense technology to precisely measure how long it takes for emitted pulses of infrared laser light to reach the nearest object and be reflected back to a detector, so it can be considered a tiny, self-contained lidar system. This time-of-flight (TOF) measurement enables it to accurately determine the absolute distance to a target

without the object's reflectance greatly influencing the measurement. The sensor can report distances of up to 2 m (6.6 ft) with 1 mm resolution, but its effective range and accuracy (noise) depend heavily on ambient conditions and target characteristics like reflectance and size, as well as the sensor configuration. (The sensor's accuracy is specified to range from ±3% at best to over ±10% in less optimal conditions.)

VL53L1X
Time of Flight Range Finder (4meter/12ft range)

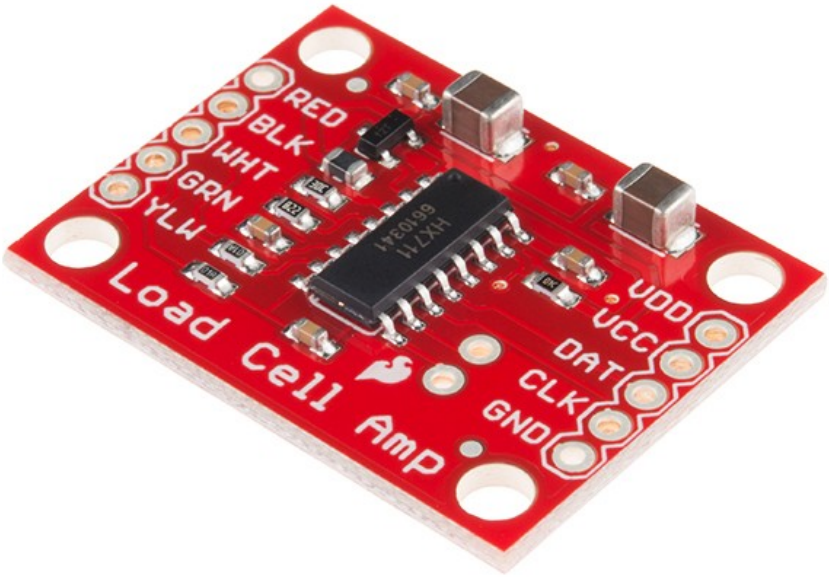
The VL53L1X is a state-of-the-art, Time-of-Flight (ToF), laser-ranging sensor, enhancing the ST FlightSense™ product family. It is the fastest miniature ToF sensor on the market with accurate ranging up to 4 m and fast ranging frequency up to 50 Hz



HX711 Load Cell Amplifier
with TAL220 Load Cell - 10kg, Straight Bar

SparkFun Load Cell Amplifier - HX711
SEN-13879
https://www.sparkfun.com/products/13879

A strain gauge is a device used to measure deformation on an object. The deformation can then be used to calculate the forces exerted on the object. The most common application is to measure weight by measuring the deflection of a cantilever that carries the weight.



The most common type of strain gauge consists of an insulating flexible backing which supports a metallic foil pattern. The gauge is attached to the object by a suitable adhesive, such as superglue. As the object is deformed, the foil is deformed, causing its electrical resistance to change. This resistance change, usually measured using a Wheatstone bridge, is related to the strain.

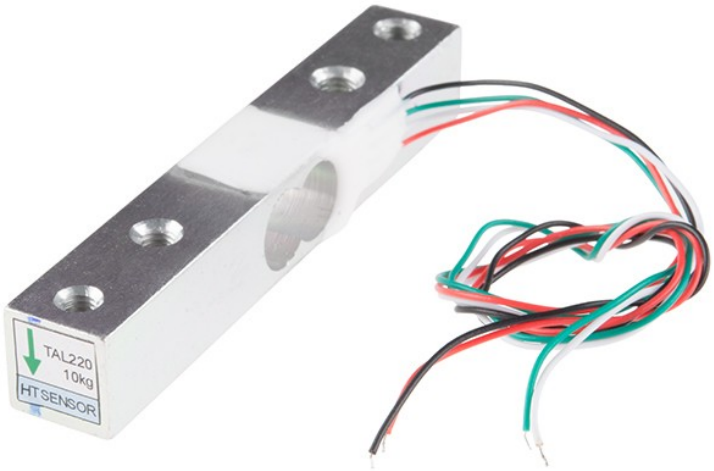
HX711 is a precision 24-bit analog-to-digital converter (ADC) designed for weigh scales and industrial control applications to interface directly with a bridge strain gauge.

The SparkFun Load Cell Amplifier is a small breakout board for the HX711 IC that allows you to easily read load cells to measure weight. By connecting the amplifier to your microcontroller you will be able to read the changes in the resistance of the load cell, and with some calibration you'll be able to get very accurate weight measurements. This can be

handy for creating your own industrial scale, process control or simple presence detection.

Load Cell - 10kg, Straight Bar (TAL220)
SEN-13329
https://www.sparkfun.com/products/13329

This straight bar load cell (sometimes called a strain gauge) can translate up to 10kg of pressure (force) into an electrical signal. Each load cell is able to measure the electrical resistance that changes in response to, and proportional of, the strain (e.g. pressure or force) applied to the bar. With this gauge you will be able to tell just how heavy an object is, if an object's weight changes over time, or if you simply need to sense the presence of an object by measuring strain or load applied to a surface.



EMS22
Absolute Rotational Encoder

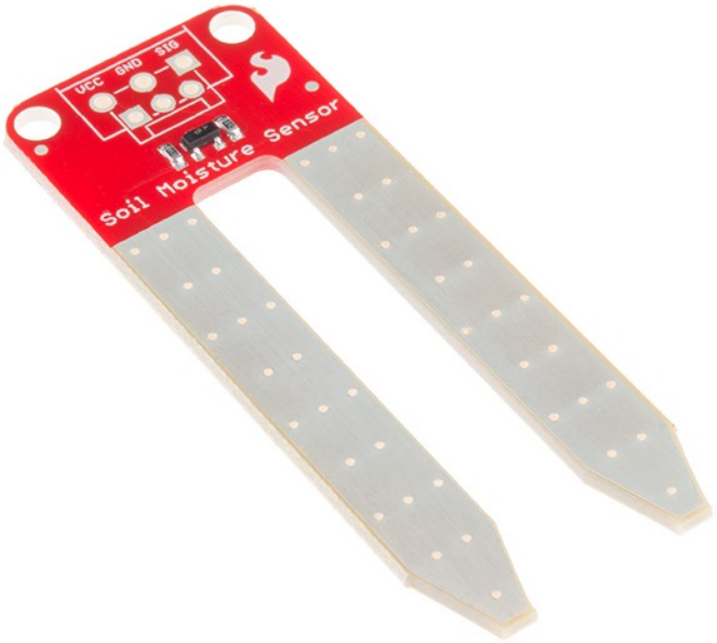
EMS22A – Is a non-contacting 1024 position absolute rotational encoder from Bourns.

Absolute output refers to the absolute angular position. This type of output is especially useful for applications where the absolute position of a device, such as a camera, is necessary to locate an object. Also with 1024 distinct angular positions, the EMS22 offers very high resolution indexing at every 0.35 °. This type of output code is not affected by a power outage to the encoder since each angular position of the encoder has a unique code.

Soil Moisture Sensor

SparkFun Soil Moisture Sensor
In stock SEN-13322
https://www.sparkfun.com/products/13322

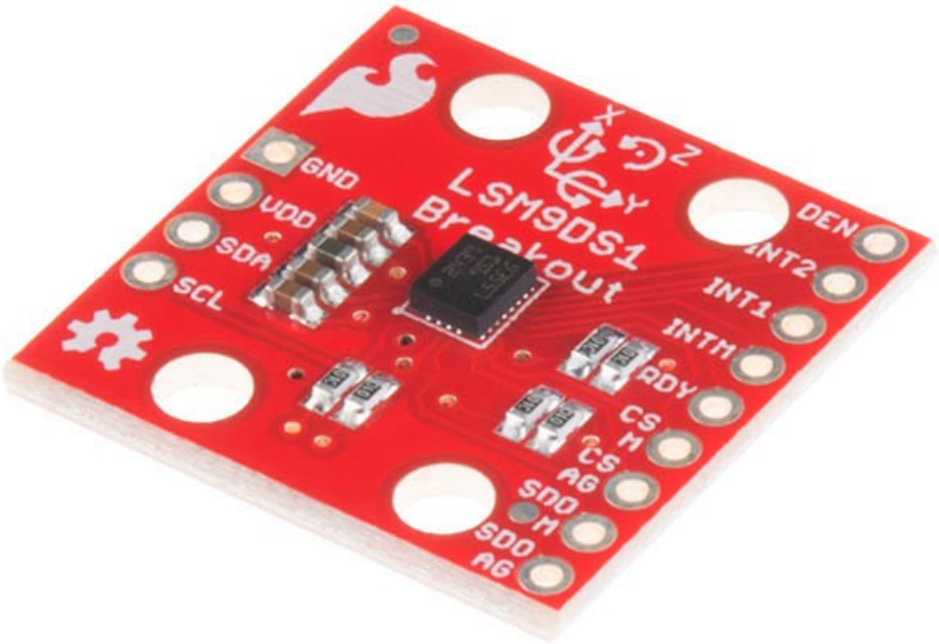
The soil moisture sensor is pretty straight forward to use. The two large exposed pads function as probes for the sensor, together acting as a variable resistor. The more water that is in the soil means the better the conductivity between the pads will be and will result in a lower resistance, and a higher signal out. We have tested this and the contacts corrode pretty fast because a DC potential is applied to the pads. We're designing a proper soil moisture sensor ourselves. To be announced soon.



LM9DS1
Inertial Measurement Module

SparkFun 9DoF IMU Breakout - LSM9DS1

SEN-13284
https://www.sparkfun.com/products/13284



3D accelerometer, 3D gyroscope, 3D magnetometer

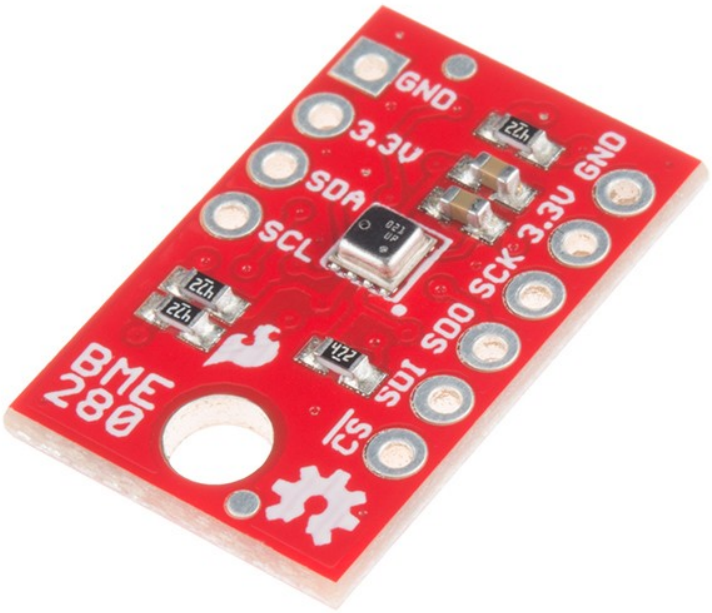
Features
•3 acceleration channels, 3 angular rate channels, 3 magnetic field channels
•±2/±4/±8/±16 g linear acceleration full scale
•±4/±8/±12/±16 gauss magnetic full scale
•±245/±500/±2000 dps angular rate full scale
•16-bit data output
•SPI / I2C serial interfaces

BME280
Atmospheric Sensor

SparkFun Atmospheric Sensor Breakout - BME280

SEN-13676
https://www.sparkfun.com/products/13676

BME280 Combined humidity and pressure sensor measures atmospheric pressure as well as relative humidity and temperature.



Features

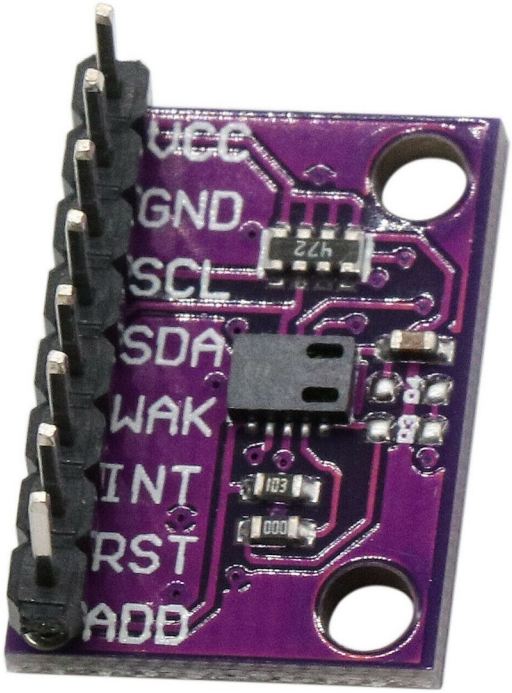
- Temp Range: -40C to 85C
- Humidity Range: 0 - 100% RH, =-3% from 20-80%
- Pressure Range: 30,000Pa to 110,000Pa, relative accuracy of 12Pa, absolute accuracy of 100Pa (note sea level standard atmospheric pressure is 101325 Pa)
- Altitude Range: 0 to 30,000 ft (9.2 km), relative accuracy of 3.3 ft (1 m) at sea level, 6.6 (2 m) at 30,000 ft.

Typical applications

- Context awareness, e.g. skin detection, room change detection
- Health monitoring/ well – being
  - Warning regarding dehydration or heat stroke
  - Spirometry (measurement of lung volume and air flow)
- Home automation control
  - control heating, venting, air conditioning (HVAC)
- GPS enhancement (e.g. time-to-first-fix improvement, dead reckoning, slope detection)
- Indoor navigation (change of floor detection, elevator detection)
- Outdoor navigation, leisure and sports applications
- Weather forecast
- Vertical velocity indication (rise/sink speed)

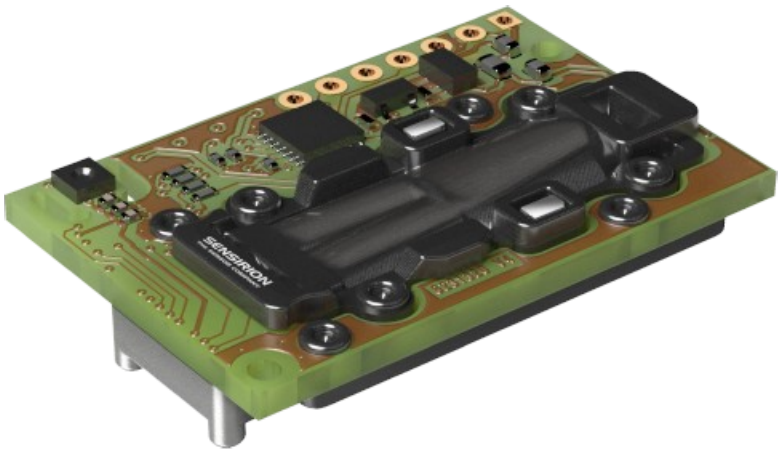
CCS811
Air Quality Sensor

The CCS811 Air Quality Breakout is a digital gas sensor solution that senses a wide range of Total Volatile Organic Compounds (TVOCs), including equivalent carbon dioxide (eCO2) and metal oxide (MOX) levels. VOCs are often categorized as pollutants and/or sensory irritants and can come from a variety of sources like construction materials (paint, carpet, etc.), machines (copiers, processors, etc.) and even people (breathing, smoking, etc.).



SCD30/40
CO2 and Relative Humidity/Temperature Sensor Modules

Carbon dioxide is a key indicator of indoor air quality. Thanks to new energy standards and better insulation, houses have become increasingly energy



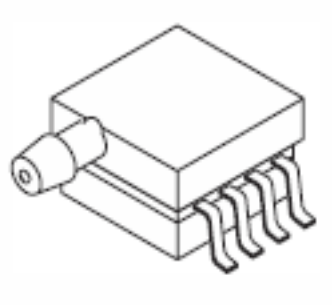
efficient, but the air quality can deteriorate rapidly. Active ventilation is needed to maintain a comfortable and healthy indoor environment, and to improve the well-being and productivity of the inhabitants. Sensirion's SCD30 offers accurate and stable CO2, temperature and humidity monitoring.

The SCD4x is Sensirion's next generation miniature CO2 sensor that offers an unmatched price-to-performance ratio. Tape and reel packaging combined with its SMD assembly processing make the SCD4x ideal for high-volume applications.

This sensor builds on the photoacoustic sensing principle and Sensirion's patented PASens® and CMOSens® Technology to enable unmatched small sensor size combined with high performance. SMD compatibility and the small footprint allow cost- and space-effective integration to boost freedom of design for customers. The integrated best-in class humidity and temperature sensor enables superior on-chip signal compensation and addition RH and T outputs. Finally, the large supply voltage (2.4 V – 5.5 V), the robustness towards external stresses and the adjustable power consumption make the SCD4x the perfect fit for varying customer needs.

MP3V5010DP
Pneumatic Pressure Sensor

https://www.digikey.com/product-detail/en/nxp-usa-inc/MP3V5010DP/MP3V5010DP-ND/2186183



Integrated Silicon Pressure Sensor
0 to 10 kPa (0 to 1.45 psi)

Connected directly to LD100 ADC input.

SSD1325
Monochrome 2.7" 128x64
OLED Graphic Display Module

https://www.adafruit.com/product/2674

These displays are 2.7" diagonal, and very readable due to the high contrast of an OLED display. This display is made of 128x64 individual white OLED pixels, each one is turned on or off by the controller chip. Because the display makes its own light, no backlight is required.

AMG8833

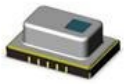
Grid-EYE Infrared Sensor Array

https://www.digikey.com/product-detail/en/panasonic-electronic-components/AMG8833/P19002CT-ND/5825306

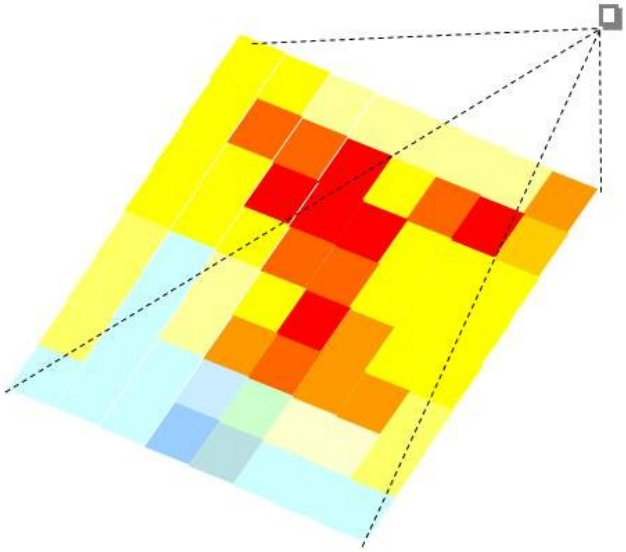
New Sensing Options

Temperature measurement

- 8x8 (64) elements measure the temperature of each area

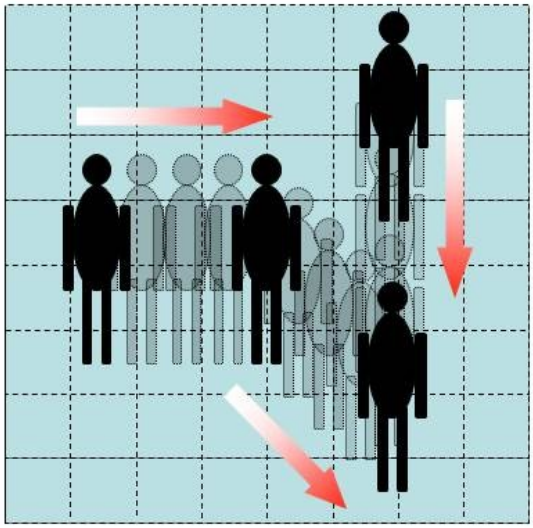


Sensor



Detecting motion / presence

- Detect movement direction: up / down, right / left, sideways
- Motionless detection



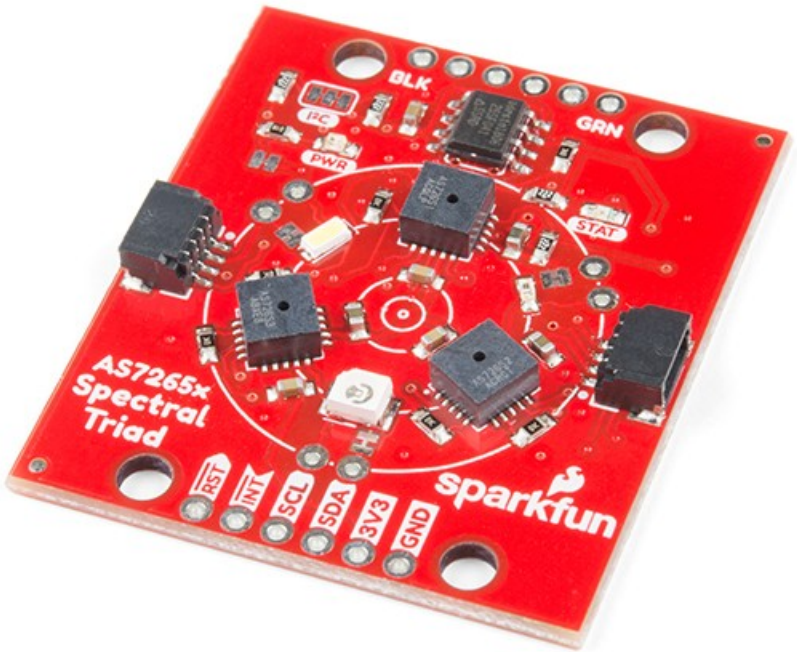
Type \ Detection	Moving object	Motionless object	Movement direction	Temperature measuring	Thermal image
Passive Infrared (Non-array)	Yes	No	No	No	No
Thermopile (Single element)	Yes	No	No	Yes	No
Grid-EYE	Yes	Yes	Yes	Yes	Yes

AS7263
Spectrophotometer, 6-Ch NIR Spectral Sensing Engine

6 near-IR channels: 610nm, 680nm, 730nm, 760nm, 810nm and 860nm, each with 20nm FWHM

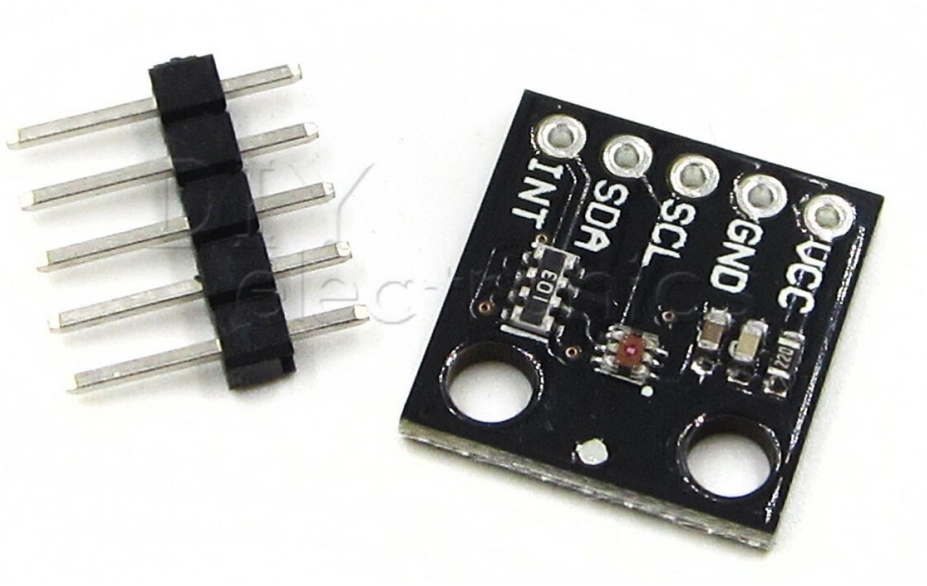
AS7265x
Spectrophotometer, Smart 18-Channel VIS+NIR Spectral_ID Sensor with Electronic Shutter

3 chip set delivering 18 VIS and NIR channels from 410nm to 940nm each with 20nm FWHM



ISL29125
Light Sensor

The ISL29125 is a low power, high sensitivity, RED, GREEN and BLUE color light sensor (RGB) with an I2C (SMBus compatible) interface. Its state-of-the-art photodiode array provides an accurate RGB spectral response and excellent light source to light source variation (LS2LS). The ISL29125 is designed to reject IR in light sources allowing the device to operate in environments from sunlight to dark rooms. The integrating ADC rejects 50Hz and 60Hz flicker caused by artificial light sources. A selectable range allows the user to optimize sensitivity suitable for the specific application.



MAX35104
Time of Flight Ultrasonic Gas Flow Meter

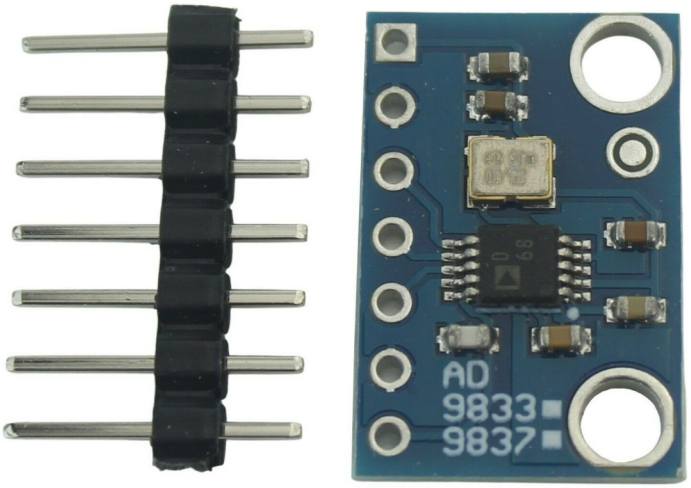
The MAX35104 is a gas flow meter system-on-chip (SoC) targeted as an analog front-end solution for the ultrasonic gas meter and medical ventilator markets. With a time measurement accuracy of 700ps and automatic differen-tial time of flight (TOF), the device makes for simplified computation of gaseous flow.

- High Accuracy Flow Measurement for Billing and Leak Detection
- Time-to-Digital Accuracy Down to 700ps Measurement Range Up to 8ms
- 2 Channels: Single-Stop Channel
- High Accuracy Temperature Measurement for Precise Flow Calculations
- One 2-Wire Sensor: PT1000, PT500 RTD, and Thermistor Support.

Applications
- Ultrasonic Gas Meters
- Medical Ventilators

AD9837
Wave generator module

The AD9837 is a low power, programmable waveform generator capable of producing sine, triangular, and square wave outputs. Waveform generation is required in various types of sensing, actuation, and time domain reflectometry (TDR) applications.



The output frequency and phase are software programmable, allowing easy tuning. The frequency registers are 28 bits wide:

with a 16 MHz clock rate, resolution of 0.06 Hz can be achieved;

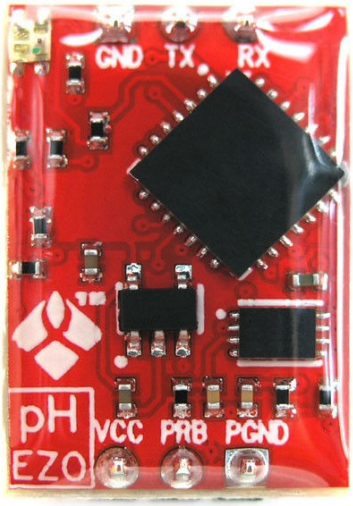
with a 5 MHz clock rate, the AD9837 can be tuned to 0.02 Hz resolution.

EZO pH
pH Sensor Amplifier

https://www.atlas-scientific.com/product_pages/circuits/ezo_ph.html

Probe Amplifier

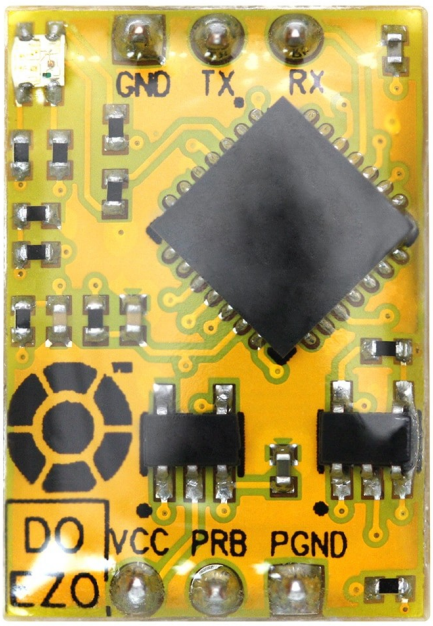
- Full range pH reading from .001 to 14.000
- Accurate pH readings down to the thousandths place (+/- 0.02)
- Temperature dependent or temperature independent readings
- Flexible calibration protocol supports single point, 2 point, or 3 point calibration



EZO DO
Dissolved Oxygen Circuit

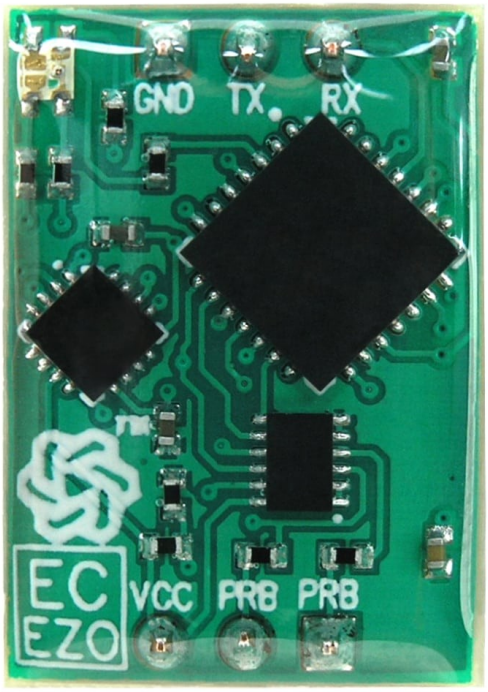
https://atlas-scientific.com/embedded-solutions/ezo-dissolved-oxygen-circuit/

Reads Dissolved Oxygen
Range 0.01 – 100+ mg/L
0.1 – 400+ % saturation
Accuracy +/- 0.05 mg/L
Response time 1 reading per sec
Supported probes Any galvanic probe
Calibration 1 or 2 point
Temp. compensation Yes
Salinity compensation Yes
Pressure compensation Yes



EZO EC
Electrical Conductivity Circuit

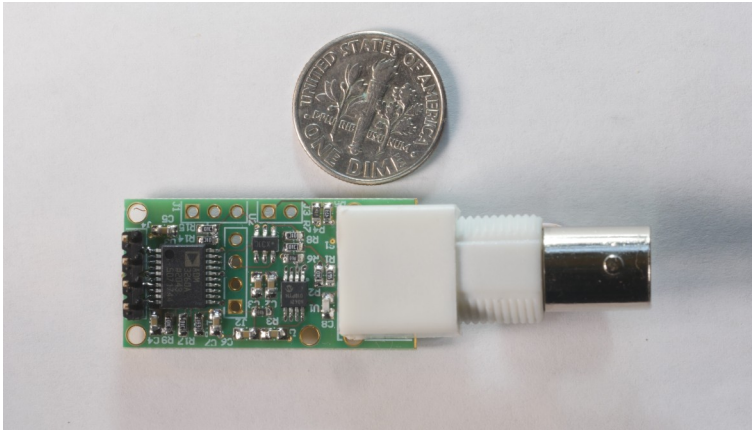
https://atlas-scientific.com/embedded-solutions/ezo-conductivity-circuit/



Reads
Conductivity: µS/cm
Total dissolved solids: ppm
Salinity: PSU (ppt) 0.00 – 42.00
Specific gravity (sea water only): 1.00 – 1.300

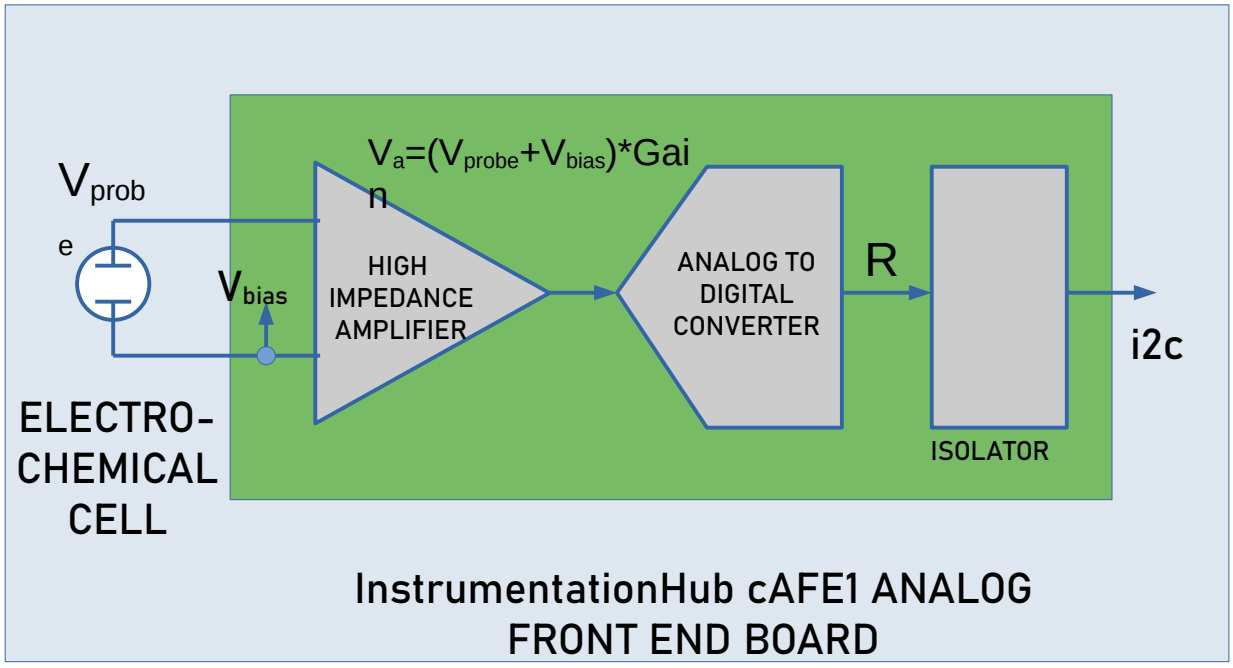
Range: 0.07 – 500,000+ µS/cm
Accuracy: +/ – 2%
Response time: 1 reading per sec
Supported probes: K 0.1 – K 10 any brand
Calibration: 2 or 3 point
Temp. compensation: Yes

cAFE1
InstrumentationHub Analog Front End Board



cAFE1 is a specially designed front end to handle electrochemical measurement cells. A high impedance instrumentation amplifier with adjustable gain and offset is connected to a 12bit analog to digital converter.

The board electronics is fully electrically isolated to prevent cross talk and leakage currents from interfering with measurements. The default configuration supports all types of glass pH electrodes. Controller connection is via an i2c interface.



An electrochemical measurement cell is a device that generates an electrical potential depending on the ion concentration of solutes. There are different types to measure different types of ions.

Some electrochemical cells include sensors for: pH, ORP (oxygen reduction potential), Dissolved Oxygen, Ammonia, Nitrite and Nitrates